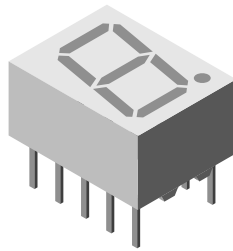




## Standard 7-Segment Display 10 mm



19236

### DESCRIPTION

The TDS.31.. series are 10 mm character seven segment LED displays in a very compact package.

The displays are designed for a viewing distance up to 6 m and available in four bright colors. The grey package surface and the evenly lighted untinted segments provide an optimum on-off contrast.

All displays are categorized in luminous intensity groups. That allows users to assemble displays with uniform appearance. Typical applications include instruments, panel meters, point-of-sale terminals and household equipment.

Due to the design of 10 mm displays, a certain amount of cross-talk between segments is unavoidable. This light leakage becomes more noticeable as the brightness of the operated segments increases. However, higher environmental illumination, or a partially transparent cover, may reduce this effect. Therefore, it's important to consider this phenomenon during design-in and to validate suitability for the particular application and all its operation modes.

### FEATURES

- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Yellow and green categorized for color
- Wide viewing angle
- Suitable for DC and high peak current
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

### APPLICATIONS

- Panel meters
- Test- and measure-equipment
- Point-of-sale terminals
- Control units

### PRODUCT GROUP AND PACKAGE DATA

- Product group: display
- Package: 10 mm
- Product series: standard
- Angle of half intensity:  $\pm 50^\circ$

PARTS TABLE														
PART	COLOR	LUMINOUS INTENSITY ( $\mu\text{cd}$ )			at $I_F$ (mA)	WAVELENGTH (nm)			at $I_F$ (mA)	FORWARD VOLTAGE (V)			at $I_F$ (mA)	CIRCUITRY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TDSO3150	Orange red	450	4500	-	10	612	-	625	10	-	2	3	20	Common anode
TDSO3150-KL	Orange red	1800	-	5600	10	612	-	625	10	-	2	3	20	Common anode
TDSO3150-L	Orange red	2800	-	5600	10	612	-	625	10	-	2	3	20	Common anode
TDSO3155	Orange red	1100	-	9000	10	612	-	625	10	-	2	3	20	Common anode
TDSO3160	Orange red	450	4500	-	10	612	-	625	10	-	2	3	20	Common cathode
TDSO3160-KL	Orange red	1800	-	5600	10	612	-	625	10	-	2	3	20	Common cathode
TDSO3160-L	Orange red	2800	-	5600	10	612	-	625	10	-	2	3	20	Common cathode
TDSY3150 <sup>(1)</sup>	Yellow	450	3000	-	10	581	-	594	10	-	2.4	3	20	Common anode
TDSY3150-K <sup>(1)</sup>	Yellow	1800	-	3600	10	581	-	594	10	-	2.4	3	20	Common anode
TDSG3150	Green	450	6800	-	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG3150-M	Green	4500	-	9000	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG3150-MN	Green	4500	-	14 000	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG3160	Green	450	6800	-	10	562	-	575	10	-	2.4	3	20	Common cathode
TDSG3160-M	Green	4500	-	9000	10	562	-	575	10	-	2.4	3	20	Common cathode

#### Note

<sup>(1)</sup> Not for new designs



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO315., TDSO316., TDSY315., TDSG315., TDSG316.</b>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage per segment or DP		$V_R$	6	V
DC forward current per segment or DP		$I_F$	20	mA
DC forward current per segment or DP	$t_p \leq 10\text{ }\mu\text{s}$ (non repetitive)	$I_{FSM}$	0.15	A
Power dissipation	$T_{amb} \leq 45\text{ }^{\circ}\text{C}$	$P_V$	480	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$
Operating temperature range		$T_{amb}$	-40 to +85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-40 to +85	$^{\circ}\text{C}$
Soldering temperature	$t \leq 3\text{ s}$ , 2 mm below seating plane	$T_{sd}$	260	$^{\circ}\text{C}$
Thermal resistance LED junction to ambient		$R_{thJA}$	120	K/W

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO3150, TDSO3150-KL, TDSO3150-L, TDSO3155, TDSO3160, TDSO3160-KL, TDSO3160-L, ORANGE RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSO3150	$I_V$	450	4500	-	$\mu\text{cd}$
		TDSO3150-KL		1800	-	5600	
		TDSO3150-L		2800	-	5600	
		TDSO3155		1100	-	9000	
		TDSO3160		450	4500	-	
		TDSO3160-KL		1800	-	5600	
		TDSO3160-L		2800	-	5600	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSO3150, TDSO3150-KL, TDSO3150-L,	$\lambda_d$	612	-	625	nm
Peak wavelength	$I_F = 10\text{ mA}$	TDSO3150-L,	$\lambda_p$	-	630	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$	TDSO3155,	$j$	-	$\pm 50$	-	$^{\circ}$
Forward voltage per segment or DP	$I_F = 20\text{ mA}$	TDSO3160,	$V_F$	-	2	3	V
Reverse voltage per segment or DP	$I_R = 10\text{ }\mu\text{A}$	TDSO3160-KL, TDSO3160-L	$V_R$	6	15	-	V

**Note**

<sup>(1)</sup>  $I_{Vmin.}$  and  $I_V$  groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is  $\geq 0.5$ , excluding decimal points and colon

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSY3150, TDSY3150-K, YELLOW</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSY3150	$I_V$	450	3000	-	$\mu\text{cd}$
		TDSY3150-K		1800	-	3600	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSY3150, TDSY3150-K	$\lambda_d$	581	-	594	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	585	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$j$	-	$\pm 50$	-	$^{\circ}$
Forward voltage per segment or DP	$I_F = 20\text{ mA}$		$V_F$	-	2.4	3	V
Reverse voltage per segment or DP	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15	-	V

**Note**

<sup>(1)</sup>  $I_{Vmin.}$  and  $I_V$  groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is  $\geq 0.5$ , excluding decimal points and colon



OPTICAL AND ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
TDSG315., TDSG316., GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	I <sub>F</sub> = 10 mA	TDSG3150	I <sub>V</sub>	450	6800	-	μcd
		TDSG3150-M		4500	-	9000	
		TDSG3150-MN		4500	-	14 000	
		TDSG3160		450	6800	-	
		TDSG3160-M		4500	-	9000	
Dominant wavelength	I <sub>F</sub> = 10 mA	TDSG3150, TDSG3150-M, TDSG3150-MN, TDSG3160, TDSG3160-M	λ <sub>d</sub>	562	-	575	nm
Peak wavelength	I <sub>F</sub> = 10 mA		λ <sub>p</sub>	-	565	-	nm
Angle of half intensity	I <sub>F</sub> = 10 mA		j	-	± 50	-	°
Forward voltage per segment or DP	I <sub>F</sub> = 20 mA		V <sub>F</sub>	-	2.4	3	V
Reverse voltage per segment or DP	I <sub>R</sub> = 10 μA		V <sub>R</sub>	6	15	-	V

**Note**

<sup>(1)</sup> I<sub>Vmin.</sub> and I<sub>V</sub> groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is ≥ 0.5, excluding decimal points and colon

LUMINOUS INTENSITY CLASSIFICATION		
GROUP	LIGHT INTENSITY (μcd)	
	MIN.	MAX.
STANDARD		
E	180	360
F	280	560
G	450	900
H	700	1400
I	1100	2200
K	1800	3600
L	2800	5600
M	4500	9000
N	7000	14 000

**Note**

- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube). In order to ensure availability, single brightness groups will not be orderable

COLOR CLASSIFICATION						
GROUP	ORANGE RED		YELLOW		GREEN	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	612	617	581	584		
2	616	621	583	586		
3	620	625	585	588	562	565
4			587	590	564	567
5			589	592	566	569
6			591	594	568	571
7					570	573
8					572	575

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

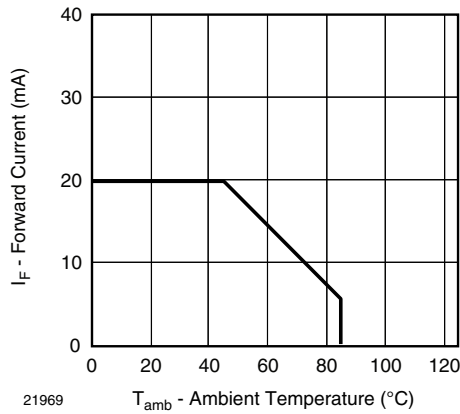


Fig. 1 - Forward Current vs. Ambient Temperature

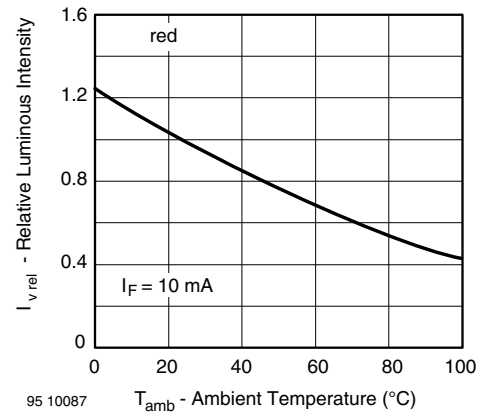


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

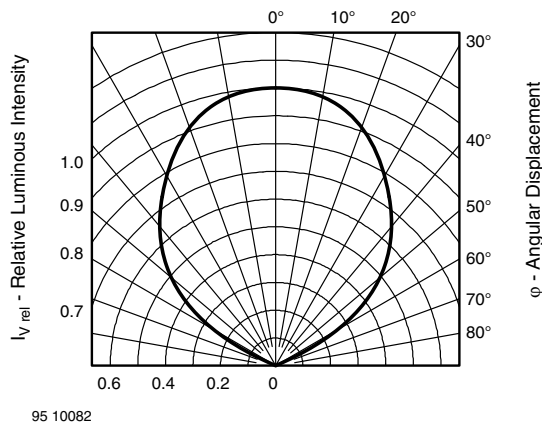


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

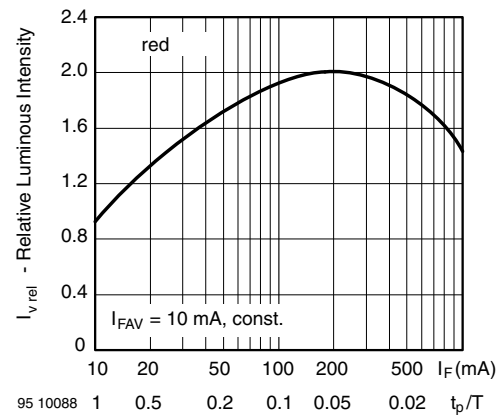


Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

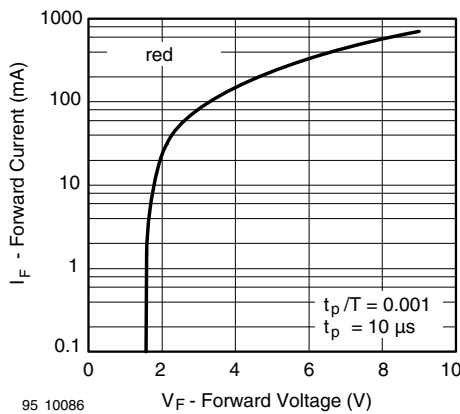


Fig. 3 - Forward Current vs. Forward Voltage

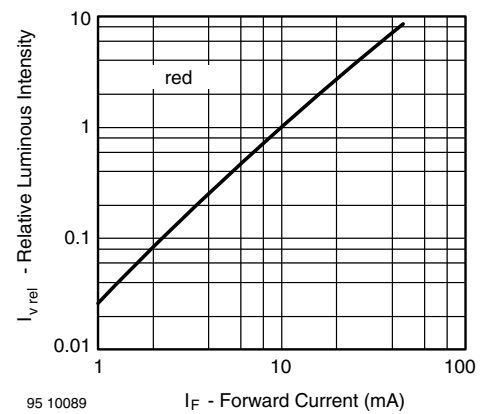


Fig. 6 - Relative Luminous Intensity vs. Forward Current

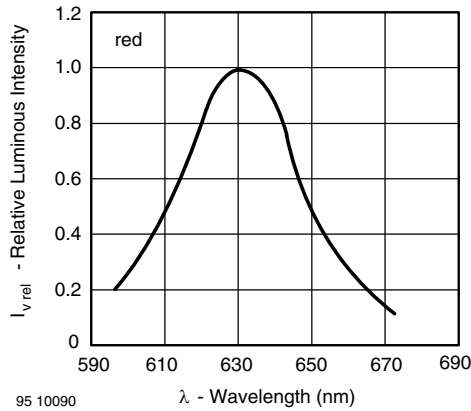


Fig. 7 - Relative Intensity vs. Wavelength

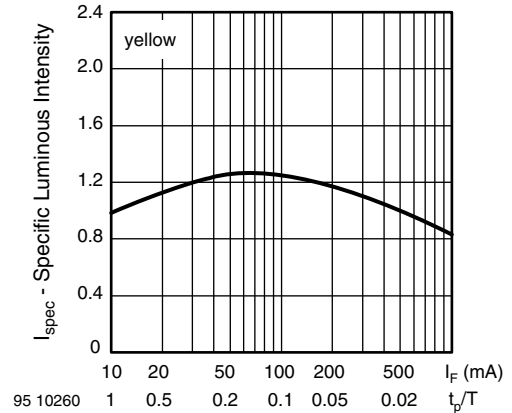


Fig. 10 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

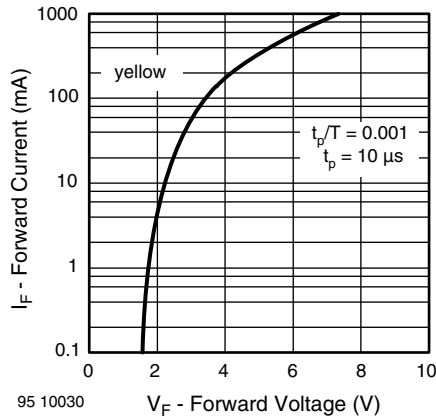


Fig. 8 - Forward Current vs. Forward Voltage

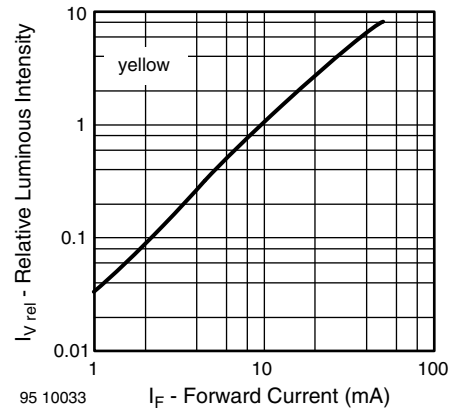


Fig. 11 - Relative Luminous Intensity vs. Forward Current

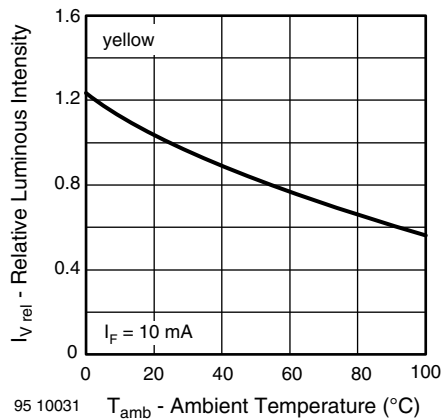


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

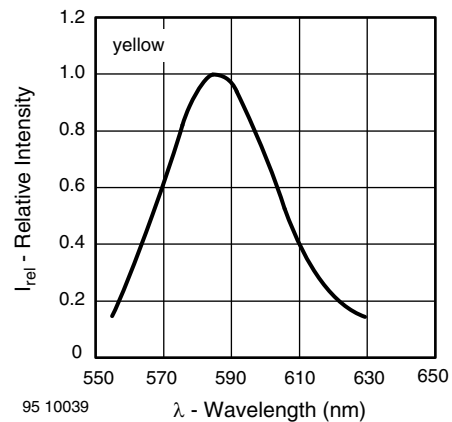


Fig. 12 - Relative Intensity vs. Wavelength

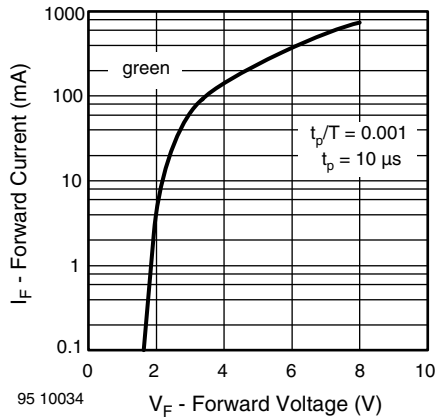


Fig. 13 - Forward Current vs. Forward Voltage

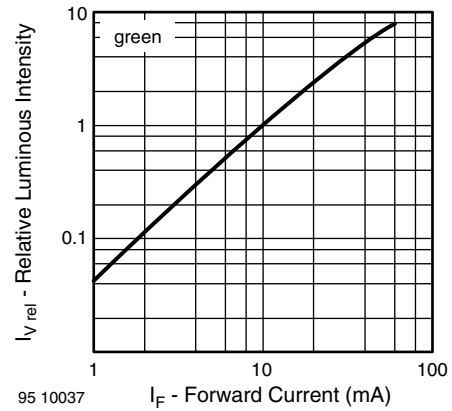


Fig. 16 - Relative Luminous Intensity vs. Forward Current

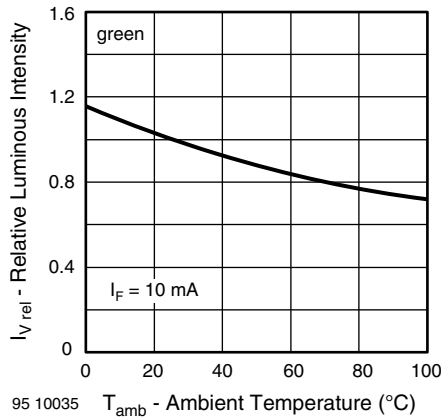


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature

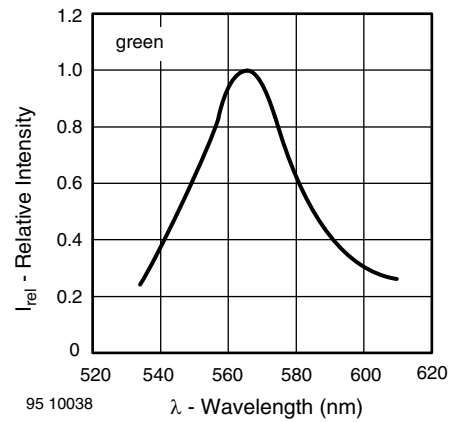


Fig. 17 - Relative Intensity vs. Wavelength

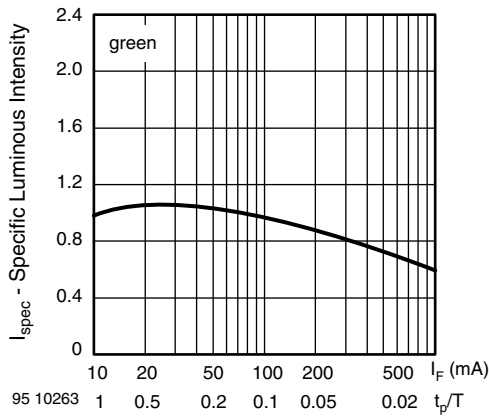


Fig. 15 - Specific Luminous Intensity vs. Forward Current

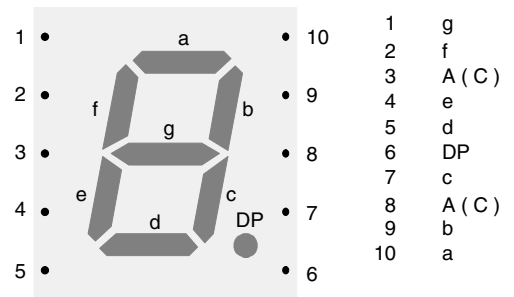
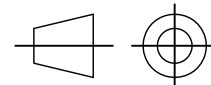
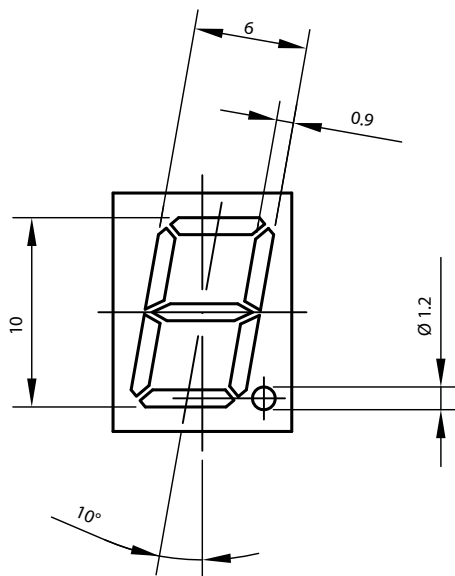
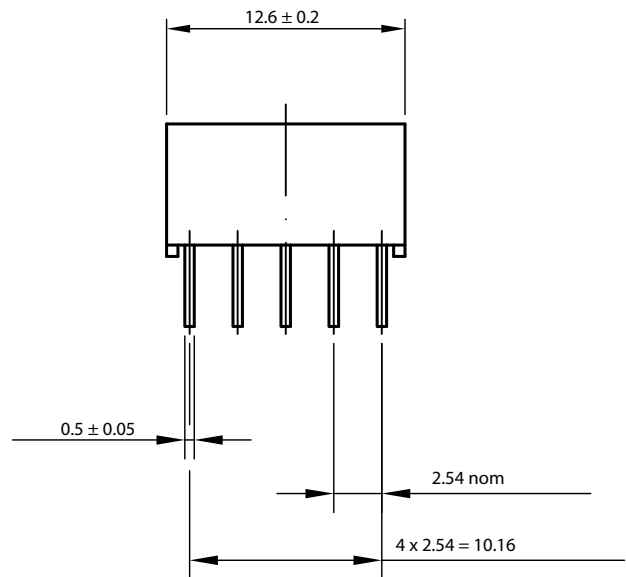
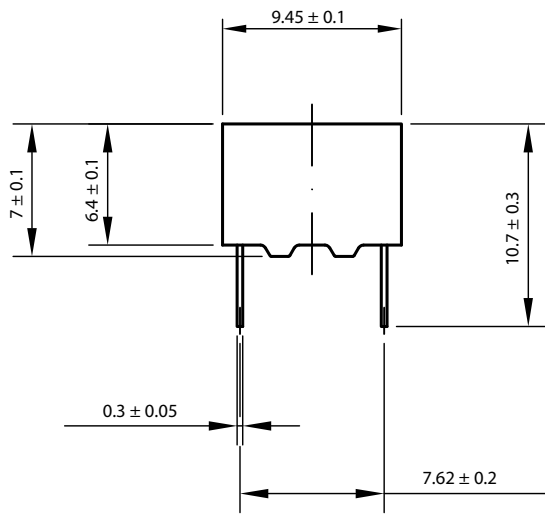


Fig. 18 - TDS.31..

96 11678



**PACKAGE DIMENSIONS FOR TDS.31..** in millimeters

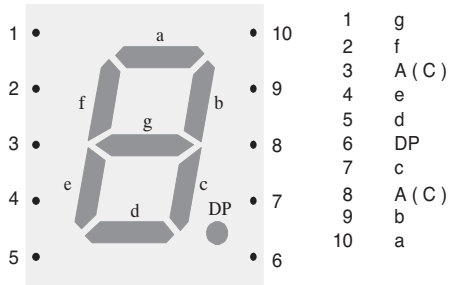


technical drawings  
according to DIN  
specifications

Drawing-No.: 6.544-5093.01-4  
Issue: 2; 23.03.2012



## Pin Connections 10 mm



9611678



### Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design  
and may do so without further notice.**

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